Radicals Validation Subgroup

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6 Presentations

NO_2: OMI column, ground based validation, Table Mtn, Ca. – S. Sander
OMI column, ground based validation, Tri-Cities, Wa. – E. Spinei
HIRDLS profiles vs ACE profiles – C. Randall

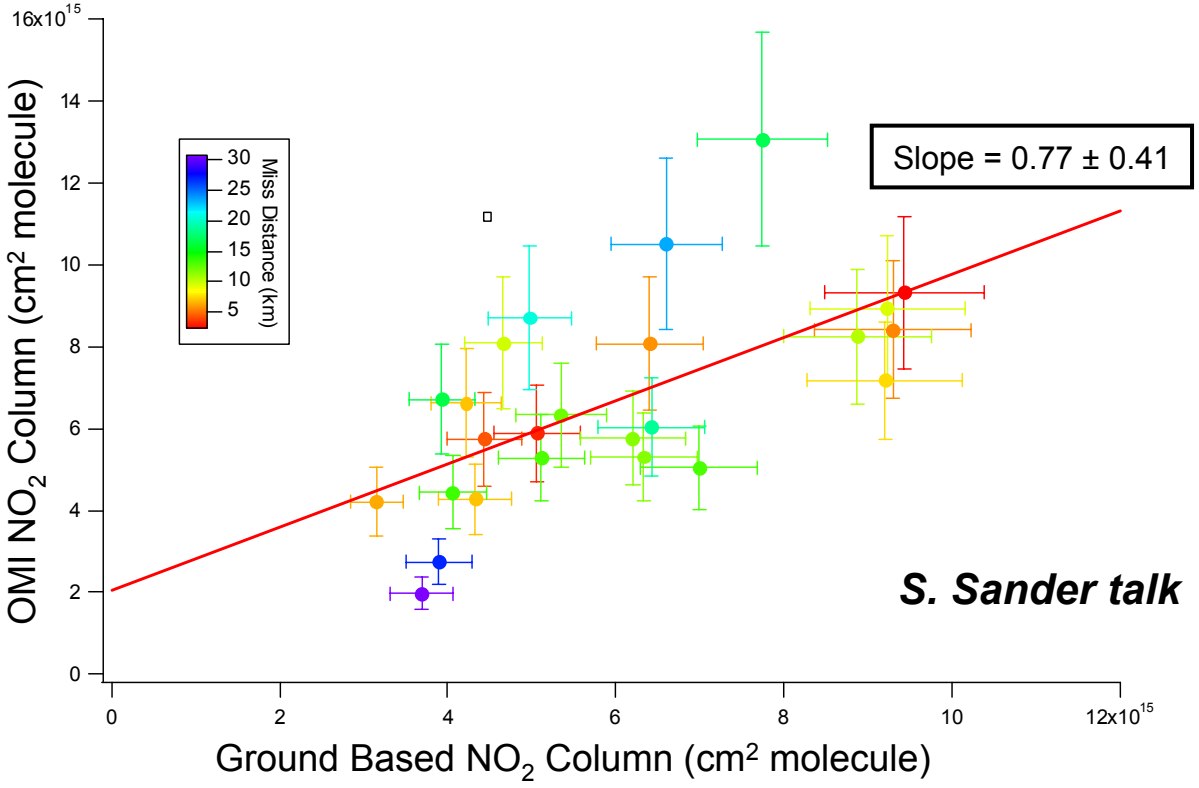
BrO: OMI global column observations – T. Kurosu
MLS profiles, balloon-based validation – L. Kovalenko

OH & HO_2:
MLS Profiles, balloon-based validation – H. Pickett and T. Canty

Notes: ClO will be discussed in chlorine breakout, Wed afternoon
Important "validation issues" highlighted in red

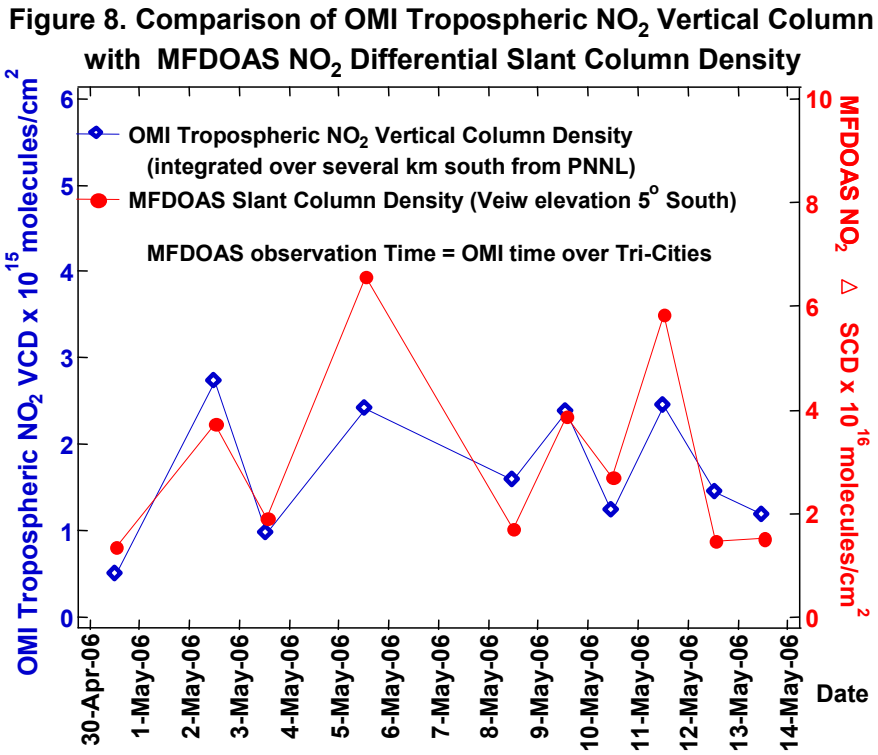
September 2006

OMI NO_2



- Mountain topography and air circulation require close coincidence with OMI footprint for proper comparison
- Reasonable correlation between OMI and ground based column NO_2
- OMI NO_2 is 20 to 30% less than ground based NO_2
- Similar results seen for Tri-City, Washington comparisons ⇒ Spinei poster and for independent OMI comparisons ⇒ Gleason talk

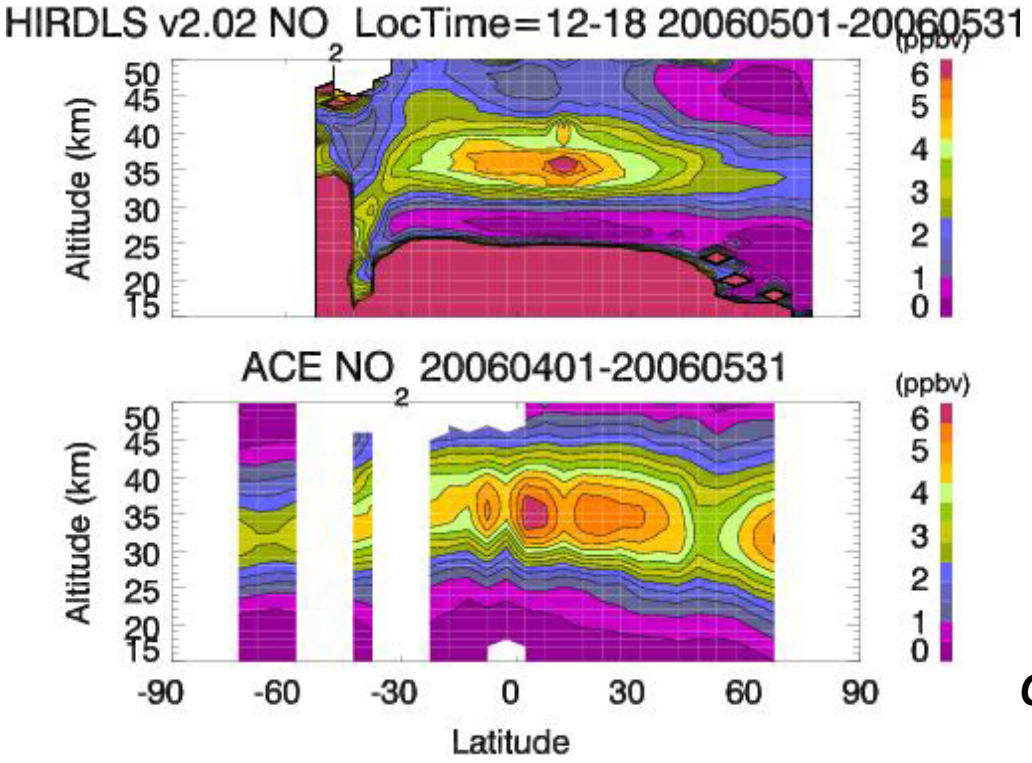
OMI NO_2



E. Spinei talk/poster

- European inter-comparison of ground based (multiple instruments) and space based NO_2 ⇒ occurring now!
- Inter-comparison campaign for NO_2 and O_3 at Table Mountain, Ca. including JPL FTUVS, WSU MF-DOAS, and GSFC instruments being planned for ~ mid-May to mid-June 2007
  - Other groups welcome
  - Coordination with Aura, TC^4 test flights, possibly SCIAMACHY desired

HIRDLS NO_2 compared to ACE NO_2

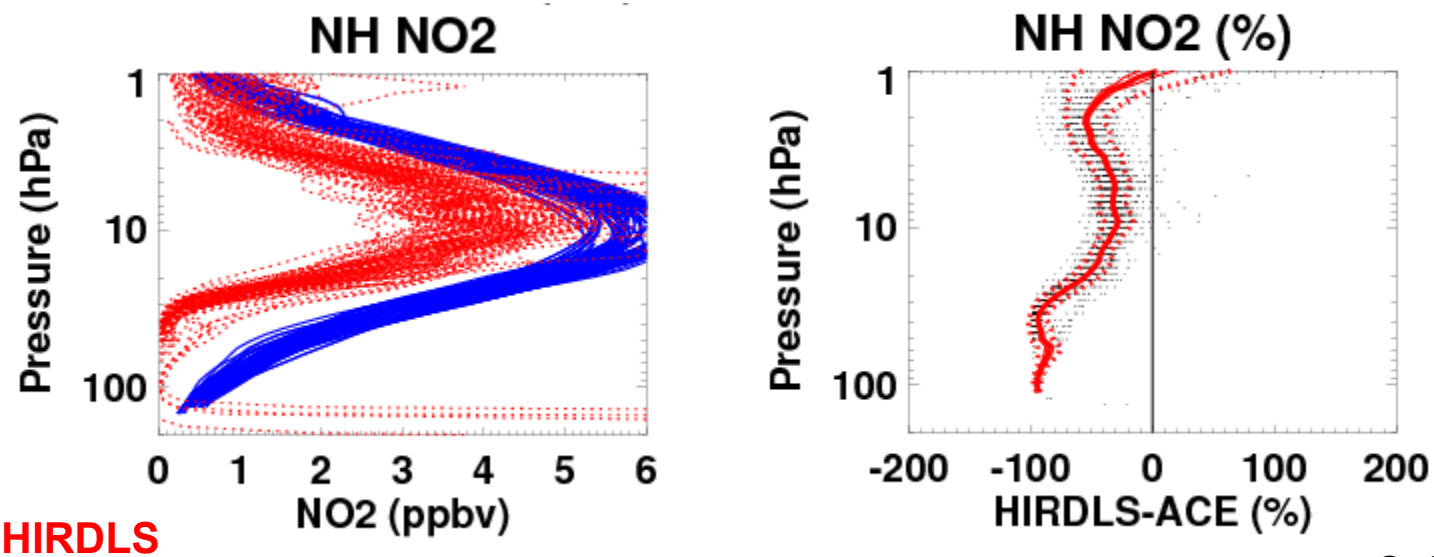


C. Randall talk

- NO_2 retrieved from HIRDLS radiances, accounting for kapton emission
- Initial comparison to ACE shows similar patterns

  $\Rightarrow$ very promising

HIRDLS NO_2 compared to ACE NO_2



RED : HIRDLS
BLUE : ACE

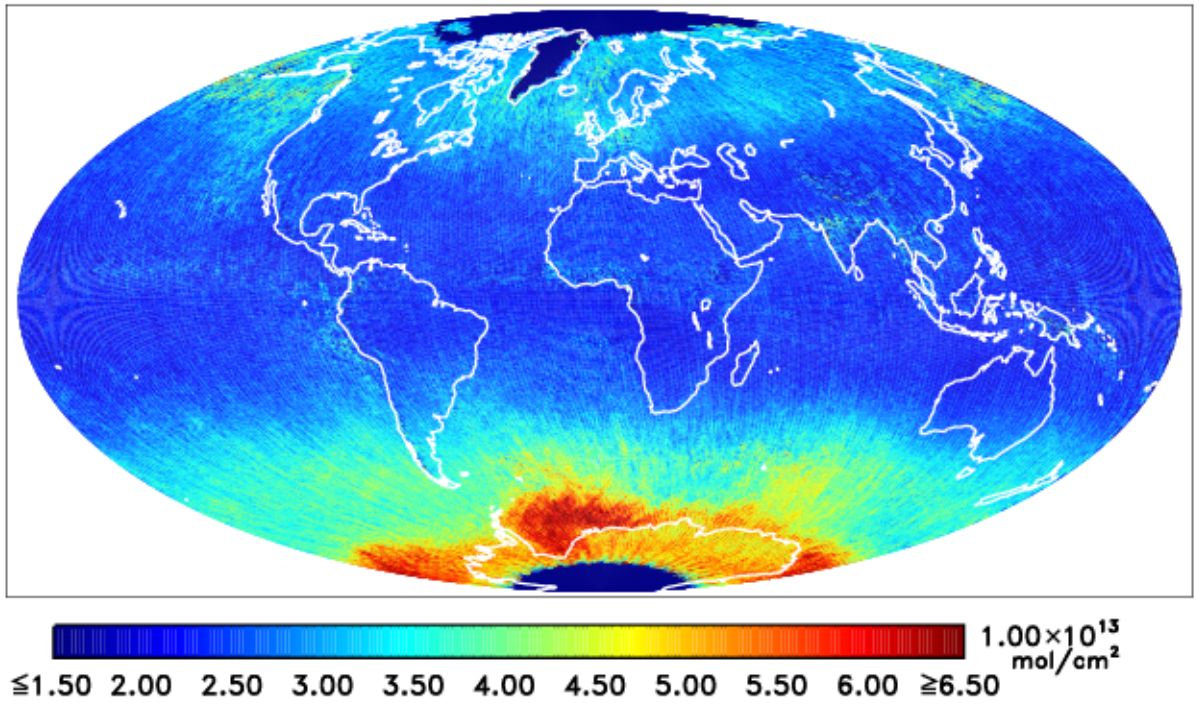
C. Randall talk

- Inter-comparisons at high latitudes only
- HIRDLS NO_2 lower than ACE by ~10 to 100%
- Note:
  - ACE NO_2 lower than HALOE NO_2 by 0 to 10%
  - Comparisons not yet factoring in "time of day" (NO_2 vs SZA goes in "right direction" for explaining some of the differences)

Improvements of HIRDLS retrieval, focusing on kapton correction, underway

Global BrO from OMI

BrO August 2006 – cloud fraction < 20%

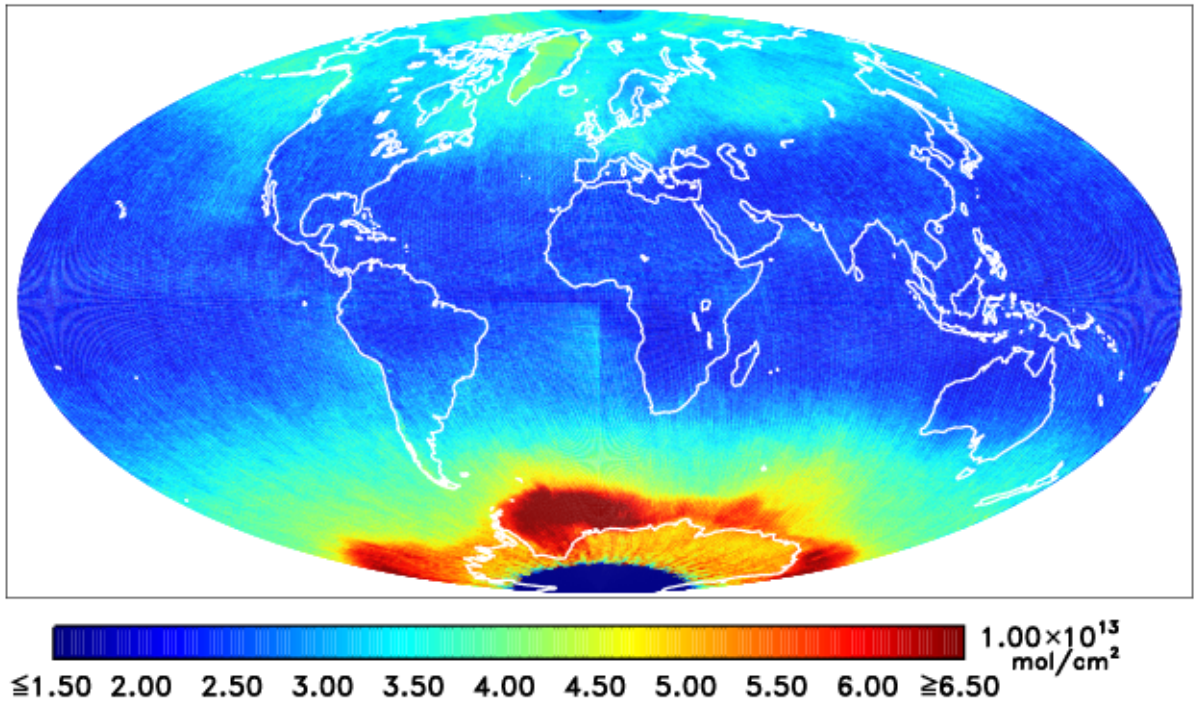


T. Kurosu talk

- ***Must use Version 0.9.50 or later !***
- First public release: Oct 2006
- BrO columns compare favorably to GOME columns (prior years)
- Release of BrO from ice shelf and salt lakes clearly seen by OMI
- Volcanic release being studied: SO_2 signal must be separated

Global BrO from OMI

BrO August 2006 – no cloud screening



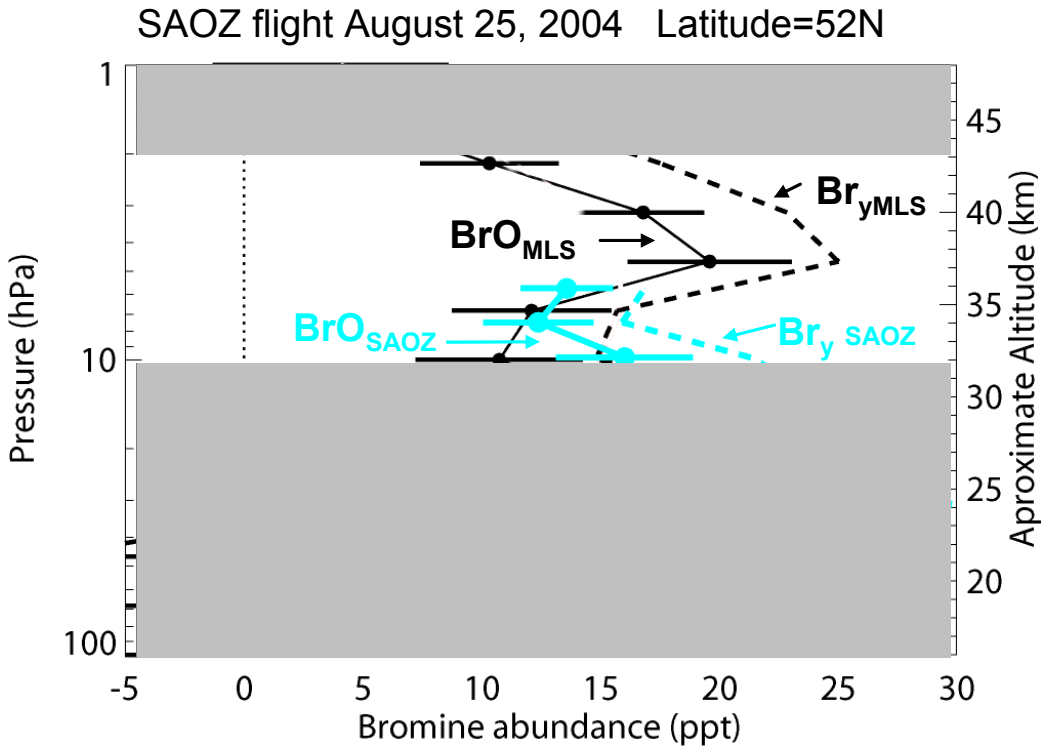
T. Kurosu talk

Future steps:

- sensitivity of BrO retrieval to O_3, NO_2 absorptions
- understanding correlation of BrO with high albedo
- tropospheric vs stratospheric contributions to column BrO
  $\Rightarrow$ bromine budget and role of VSL bromocarbons

Empirical "OMI-based" quantification of tropospheric vs stratospheric contributions to column BrO will be attempted. Nonetheless, acquisition of aircraft BrO profiles in OMI footprint is an outstanding, as yet unachieved validation need

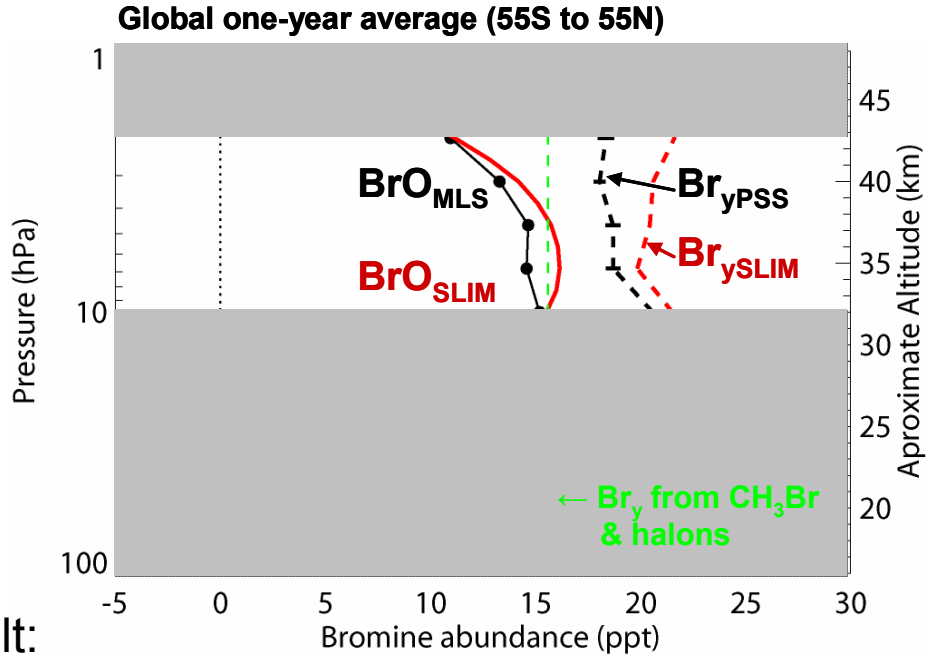
Upper stratospheric BrO from MLS



L. Kovalenko talk

- Three versions of MLS BrO:
  - 1.5 : not useful for scientific analysis
  - BinRad : research adjunct of 1.5, useful for scientific analysis from 2 to 10 hPa
  - 2.1 : looks better than 1.5, but not as good as BinRad
- MLS (BinRad) and SAOZ (balloon) BrO and Br_y agree to within respective uncertainties, 2 to 10 hPa
- MLS and DOAS (balloon) BrO also agree within uncertainties

Upper stratospheric BrO from MLS



L. Kovalenko talk & N. Livesey paper

First science result:

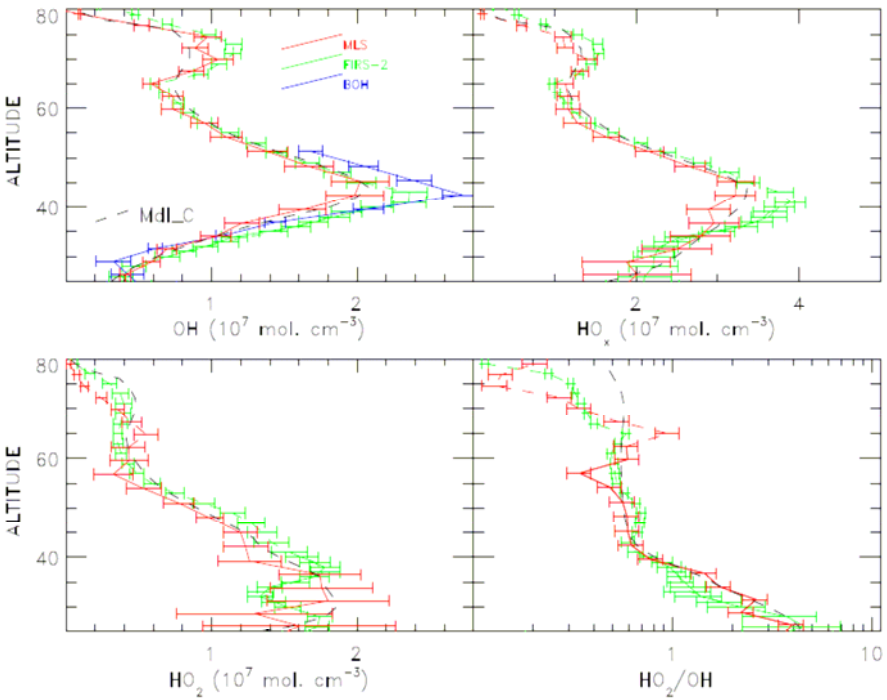
- Br_y = 18.6 ± 5.5 ppt
- VSL bromocarbon contribution to Br_y $\Rightarrow$ 3.0 ± 5.5 ppt

Livesey et al., GRL, accepted, 2006

Near Future:

- Comparison of Vers 2.1 BrO with SLIMCAT, DOAS, SAOZ, & SCIAMACHY
- Extend BrO profile to higher altitudes using model day/night differences
- Use of stratospheric BrO profiles in analysis of column BrO
  (i.e., synergistic analysis of MLS and OMI BrO)

Upper stratospheric HO_x : Sept 2005

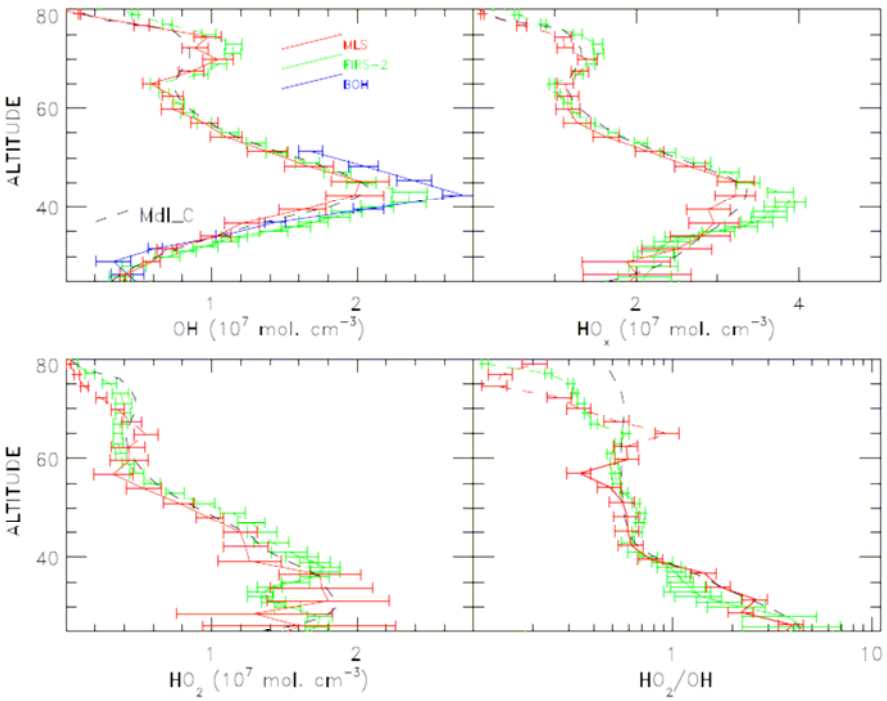


H. Pickett & T. Canty talk & T. Canty poster;

Update to:
H. Pickett et al.
& T. Canty et al.
GRL 2006 papers

- Figures show OH, HO_2, HO_x, and HO_2/OH from:
  - MLS Vers 2.1 (red), two balloon instruments (FIRS-2 and BOH) (green/blue), and model (black)
- Vers 2.1 provides:
  - higher vertical resolution retrieval of mesospheric OH
  - smoother stratospheric retrieval HO_2
- Greater discrepancy between MLS and balloon OH near 40 km during Sept 2005 than seen during Sept 2004
  - reasons under study and not yet understood, but *not* due to updated MLS retrieval version
  - Sept 2004 profiles were subject of published HO_x validation paper (Pickett et al., GRL, 2006)

Upper stratospheric HO_x : Sept 2005



H. Pickett & T. Canty talk & T. Canty poster;

Update to:
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Initial science results, based on MLS Vers 1.5 and Sept 2004 balloon data:

- No indication of previously noted "HO_x dilemma" in comparison of modeled & meas HO_x profiles
- Change to HO_x kinetics resulting in "best agreement" with HO_x does not resolve upper stratospheric "ozone deficit problem"
- Above results based on MLS Vers 1.5 profiles, Sept 2004 to June 2005 & Sept 2004 balloon data (Canty et al., GRL, 2006)

Preliminary analysis of MLS Vers 2.1 profiles for Sept 2005
yields same scientific conclusions as above (Canty et al. poster)